NOTES AND NEWS

SOME NOTES ON THE CALCULATION OF MOLECULAR FORMULAE FOR GLAUCONITE

C. O. HARVEY, *Geological Survey and Museum, London, S.W.7.*

Hendricks and Ross[1] propose for glauconite a formula of the general type $X_A(Al, Fe''', Fe'', etc.)_\Sigma(Al, Si)_4O_{10}(OH, F)_2$, where $X=(K, Ca, Na, etc.)$, $A=1.00$ or less, and Σ must be 3 or less. They state that a convenient method for calculating a formula is to reduce the analytical values of the ions having octahedral and tetrahedral coordination to their molal values, and then to assume that Al is distributed between tetrahedral and octahedral coordination so as to have $\Sigma=2.00$. Further calculation provides a figure (f) for (Al, Si), and the amounts of the various ions in the trial formula are now obtained by a calculation which includes multiplying their molal values by 4/f. They find that the sum of the cation valencies given by this trial formula will, in general, differ from the figure 22, required to balance the 10 oxygen atoms plus 2 hydroxyls, and, in order to bring the two figures into agreement, aluminium must be interchanged between tetrahedral and octahedral coordination. Hendricks and Ross do this by trial and error, and thus arrive at a formula for any particular specimen of glauconite.

TABLE 1

	%	Mols.	Metal +silicon atoms	Valencies	Metal+silicon atoms per 22 valencies	Formula	Hendrick & Ross Formula
SiO_2	49.4	0.8225	0.823	3.292	3.619	3.62 } 4.00	3.63 Si
Al_2O_3	10.2	0.1001	0.200	0.600	0.879	0.38 }	0.37 Al
						0.50 }	0.51 Al
Fe_2O_3	18.0	0.1127	0.225	0.675	0.990	0.99 } 2.06	0.99 Fe'''
FeO	3.1	0.0432	0.043	0.086	0.189	0.19 }	0.18 Fe''
MgO	3.5	0.0868	0.087	0.174	0.383	0.38 }	0.38 Mg
CaO	0.6	0.0107	0.011	0.022	0.048	0.05 }	{ Ca
K_2O	5.1	0.0541	0.108	0.108	0.475	0.48 } 0.73	0.75 { K
Na_2O	1.4	0.0226	0.045	0.045	0.198	0.20 }	{ Na
Total				5.002			

[1] *Am. Mineral.* **26** 683–708 (1941).

The main object of the present notes is to point out that this somewhat elaborate calculation is not necessary.

Hendricks and Ross initially make the assumption that the total number of metal plus silicon ions is 6, but they subsequently assume that the formula contains 10 oxygen atoms plus 2 hydroxyls (i.e. 22 valencies). As the latter assumption is to be made, one may just as well make it at the beginning of the calculation, and proceed on this basis.

TABLE 2

	%	Metal+silicon atoms per 22 valencies	
SiO_2	50.40	3.750	Si 3.750 } *4.00*
Al_2O_3	6.46	0.566	Al 0.250 }
			Al 0.316 }
TiO_2	0.09	0.005	Ti 0.005 }
Fe_2O_3	20.17	1.128	Fe''' 1.128 }
FeO	1.43	0.089	Fe'' 0.089 } *2.02*
MnO	0.02	0.001	Mn 0.001 }
Cr_2O_3	0.03	0.002	Cr 0.002 }
MgO	4.34	0.481	Mg 0.481 }
Li_2O	tr.		
K_2O	7.57	0.718	K 0.718 }
Na_2O	0.11	0.016	Na 0.016 } *0.74*
Rb_2O**	0.02	0.001	Rb 0.001 }
Cs_2O**	not found		
BaO**	not found		
H_2O above 105°C.	5.02	(H, 2.493)	
H_2O below 105°C.	4.06	(H, 2.013)	
CaO**	0.03		
P_2O_5	0.04		
CO_2	0.0		
S	0.03		
	99.82		
F	<0.02		

** Based on spectrographic work by J. A. C. McClelland.
Magnetic separation by A. F. Hallimond.
Analyst, C. O. Harvey.

By ignoring the analytical figures for H_2O and F, and calculating on the basis of 11 oxygen atoms, one may, by the usual procedure, calculate the proportions of the metal and silicon ions. Alternatively, one may work on a valency basis, assuming 22 valencies, as indicated in Table 1. The example is taken from the paper by Hendricks and Ross (p. 689), and the figures obtained by their method of calculation are quoted for comparative purposes.

A sample of glauconite was recently obtained by magnetic separation from the glauconite sand in the middle division of the Bracklesham Beds, Chobham Common, Surrey. The figures obtained by chemical analysis and the interpretation by the method outlined in Table 1 are given in Table 2.

This sample of glauconite contains very little Ca (only sufficient to combine with the P_2O_5), and only a small amount of Na, X being almost entirely potassium.

These notes are published by permission of The Director, Geological Survey and Museum, and of The Government Chemist.

PROCEEDINGS OF SOCIETIES

PHILADELPHIA MINERALOGICAL SOCIETY

The Academy of Natural Sciences of Philadelphia, March, 4, 1943

A meeting was held on the above date with Dr. W. Hersey Thomas presiding. Fifty-four members and visitors were present. Professor Richmond E. Myers of Muhlenberg College gave an illustrated talk on "Pennsylvania the Unsuspected." Points of geological and mineralogical interest were shown by slides, such as the Grand Canyon at Wellsboro, the cement district of the Lehigh region, the slate deposit at Slatington, the Kibblehouse quarry, and the Rock City conglomerate deposit at the northern border, which exhibits large open eroded veins. Views were shown of the jasper cliffs located in the hills above Reading which were extensively worked by the Indians for their arrowheads. Diggings and dumps still remain in which Indian relics are occasionally found. Professor Myers stated that recent borings at Friedensville indicate that zinc deposits still exist in the unworked areas and that possibly the region may be mined again.

Meeting of April 1, 1943

Dr. W. Hersey Thomas presided. Fifty members and visitors were present. Dr. Joseph L. Gillson addressed the Society on "The Flotation Process of Ore Concentration."

John Cochrane exhibited a specimen of the rare element indium and tubes containing small nuggets of native osmiridium.

Meeting cf May 6, 1943

Forty-one members and visitors were present with Dr. W. Hersey Thomas presiding. Dr. Duncan Stewart, Jr., of Lehigh University gave a lecture on "The Petrography of Antarctic Rocks." Paul Seel reported on trips taken to Prospect Park, Kibblehouse quarry and Wheatley mine and exhibited a number of specimens.